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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDREW D. BAILEY, III,
ALAN M. SCHOEPP,
DAVID J. HEMKER, and
MARK H. WILCOXSON

Appeal 2008-001547
Application 09/470,236
Technology Center 1700

Decided: August 31, 2009

Before JEFFREY T. SMITH, BEVERLY A. FRANKLIN, and
KAREN M. HASTINGS, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from a final rejection of
claims 1-10, 16, 17, 19, 23-25, 28-33, 35, 36, 42-45, 48, 50, 54, and 57-75.
We have jurisdiction under 35 U.S.C. § 6.

Appellants' claimed invention is directed to a plasma processing system. Claim 1 is illustrative:

1. A plasma processing system, said plasma processing system comprising:

a substantially cylindrical plasma processing chamber configured for etching a semiconductor substrate, said substantially cylindrical plasma processing chamber including a top region located on the top surface of said substantially cylindrical plasma processing chamber and a peripheral region located on a side surface surrounding the periphery of said substantially cylindrical plasma processing chamber, said substantially cylindrical plasma processing chamber including at least an inner wall; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling flow of a single input gas comprising a mixture of etchant source gases into at least two different regions of said plasma processing chamber, said gas flow system comprising a gas inlet for receiving said single input gas that is to be delivered into said plasma processing chamber and at least first and second gas outlets configured to deliver the same said single input gas to at least two different regions including at least one peripheral region and at least one top region of said plasma processing chamber, said peripheral region of said plasma processing chamber not including any points of said top region of said plasma processing chamber, at least a first portion of said input gas being delivered to said plasma processing chamber via said first outlet and a remaining portion of said input gas being delivered to said plasma processing chamber via said second outlet, the first portion and the remaining portion of said input gas having the same mixture of etchant source gases so that said at least two different regions receive the same mixture of etchant source gases, the gas flow system being configured to vary the amounts of first and remaining portions in order to control the

distribution of neutral gas components inside the plasma processing chamber thereby improving process uniformity.

The Examiner relies upon the following references:

Yamazaki	US 4,105,810	Aug. 8, 1978
Fujiyama	US 4,529,474	Jul. 16, 1985
Fujii	US 4,980,204	Dec. 25, 1990
Ueda	US 5,810,932	Sep. 22, 1998
Li ('830)	US 6,009,830	Jan.4, 2000
Collins	US 6,024,826	Feb. 15, 2000
Li ('551)	US 6,070,551	Jun. 6, 2000
Kadomura	US 6,096,160	Aug. 1, 2000
Muruges	US 6,228,781 B1	May 8, 2001
Wing	US 6,277,235 B1	Aug. 21, 2001

Claims 63 and 69 stand rejected under 35 U.S.C. § 112, first paragraph, as not complying with the written description requirement.

Appealed claims 1-10, 16, 17, 19, 23-25, 28-33, 35, 36, 42-45, 48, 50, 54, and 57-75 stand rejected as unpatentable under 35 U.S.C. § 103(a) as follows:

Claims 1, 3, 7-10, 16, 17, 70, 71, and 75 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Li '551 in view of Fujii or Fujiyama or Yamazaki.

Claims 1-5, 7-10, 16-17, 50, 57, 59, 62, 67-68, 70-71, and 75 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Li '551 in view of Fujii, or Fujiyama, or Yamazaki.

Claim 6 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Li '551 in view of Fujii, or Fujiyama, or Yamazaki further in view of Wing.

Claims 58, 60, 61, and 63-65 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Li '551 in view of Fujii, or Fujiyama, or Yamazaki further in view of Li '830.

Claims 1-5, 7-9, 16-17, 19, 23-25, 28-33, 35, 42-44, 48, 50, 54, 66-68, 70-73, and 75 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Collins in view of Fujii, or Fujiyama, or Yamazaki.

Claims 6 and 36 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Collins in view of Fujii, or Fujiyama, or Yamazaki further in view of Wing.

Claims 10 and 57-65 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Collins in view of Fujii, or Fujiyama, or Yamazaki further in view of Li '551.

Claims 45 and 74 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Collins in view of Fujii, or Fujiyama, or Yamazaki further in view of Ueda and Kadomura.

Claims 1-5, 7-10, 16-17, 19, 23-25, 28-33, 35, 42-44, 48, 54, 57, 59, 62, 66, 70-72, and 75 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Murugesh in view of Fujii, or Fujiyama, or Yamazaki.

Claims 6 and 36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Murugesh in view of Fujii, or Fujiyama, or Yamazaki further in view of Wing.

Claims 45 and 74 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Murugesh in view of Fujii, or Fujiyama, or Yamazaki further in view of Ueda and Kadomura.

Claims 58 and 60-61 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Murugesh in view of Fujii, or Fujiyama, or Yamazaki further in view of Li '830.

The § 112, first paragraph rejection.

Claims 63 and 69 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the original specification in such a way as to reasonably convey that Appellants were in possession of the invention now claimed at the time of filing.

Have Appellants shown the Examiner reversibly erred in concluding that the Specification does not provide sufficient enabling description of the claim feature discussed below.

According to the Examiner:

[T]he specification, as originally filed, there is no support for the limitation “the gas distribution plate and the gas ring cooperating to release the identical input gas in an azimuthally symmetric manner inside the plasma process chamber” as disclosed in claim 63, lines 4-5. There is nothing in the specification to indicate that the gases will have exactly or identical compositions. Furthermore, the specification, as originally filed, fails to find support for the limitation “a single

source of input gas” as recited in claim 69-line 8.
It appears from fig. 2 that more than one gas
source is contemplated.

(Ans. 8).

Appellants contend the Specification provides sufficient description to enable all features of the claim (App. Br. 9-10). We agree. The Specification, page 8, lines 25-28 states: “source gas can be a single gas or a mixture of gases. The gas flow controller also includes outlets 226 and 228 that supply the source gas to different locations of the plasma processing chamber 202 in a controlled fashion.” Appellants conclude that “[s]ince an embodiment is described wherein the source gas is a single gas, and this single gas is supplied to different locations of the plasma processing chamber, there is support for the idea that the identical input gas is released in an azimuthally symmetric manner inside the plasma process chamber.” (App. Br. 9). Therefore, we reverse.

The Prior Art Rejections.

For each of the prior art projections on appeal the issue presented for review is: Have Appellants established that the Examiner reversibly erred in rejecting the appealed subject matter under 35 U.S.C. §103 (a) over the prior art references set forth above? We answer this question in the negative.

In addressing the rejections on appeal, Appellants have not separated their arguments corresponding to the stated rejections. Rather, Appellants have grouped the arguments together under separate headings for claims 1, 19, and 50. (App. Br. 16-18). Appellants have not separately argued any

other particular claim. Accordingly, all of the claims, as separately rejected, stand or fall together.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in full agreement with the Examiner that the claimed subject matter is unpatentable over the cited prior art. Accordingly, we will sustain the Examiner's rejections for the reasons set forth in the present record, and we add the following for emphasis only.¹

Appellants have not addressed the specific teachings of the individual references as relied upon by the Examiner to establish obviousness. Rather, Appellants generally contend that the combined teachings of the primary references Li '830, Li '551, Collins, or Muregesh taken with Fujii, Fujiyama, and Yamakazi do not disclose the limitations claims 1, 19, and 50. (App. Br. 16-18).

We do not agree. The Examiner properly determined that Li '830, Li '551, Collins, and Muregesh each taken with Fujii, Fujiyama, and Yamakazi would have suggested to one of ordinary skill in the art a plasma processing system comprising a gas flow system coupled to the plasma processing chamber that allows the same mixture of etchant source gases into at least two different regions of the plasma processing chamber as described in claims 1, 19, and 50. (Ans. generally). The present record reveals that it is

¹ In rendering this decision, we have considered the Appellants' position presented in the Brief filed September 14, 2006 and the Reply Brief filed February 12, 2007, and the Examiner's position set forth in the Examiner's Answer, dated December 28, 2006.

known by persons of ordinary skill in the art that it is important to tightly control a number of parameters within the plasma processing chamber to obtain a high tolerance etch a result. Specifically the specification states:

[a]s is known by those skilled in the art, in the case of etch processes, a number of parameters within the plasma processing chamber are tightly controlled to maintain high tolerance etch results. Gas composition, plasma excitation, and chamber conditions are process parameters that affect etch results. (Spec. 3, ll. 15-18).

The references cited by the Examiner exemplify the conditions that are required to be controlled in order to obtain desired etch results. It is not disputed that the various cited references describe processing chambers that comprise multiple gas inlets including a peripheral region and a top region. As set forth above, it is recognized by persons of ordinary skill in the art that the composition of the gas affects the etch results. Consequently, we determine that it is well within the ambit of one of ordinary skill in the art to employ the same gas composition entering a plasma processing chamber at multiple locations in order to obtain desired etching results as exemplified by Li '830, Li '551, Collins, or Muregesh taken with Fujii, Fujiyama, and Yamakazi. "Section 103 forbids issuance of a patent when 'the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

subject matter pertains.’” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). *cf. In re Boesch*, 617 F.2d 272, 276 (CCPA 1980) ([D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.”); *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

Appellants do not dispute the Examiner’s findings regarding the Wing, Ueda, and Kadomura references. Rather, Appellants argue that “[w]ith regards to all the claims mentioned above, the remaining references of *Wing*, *Ueda*, and *Kadomura*, which are used to reject dependent claims do not overcome their deficiencies. That is, the [sic, they] also fail to teach or suggest the limitations of the independent claims.” (App. Br. 18). These arguments are not persuasive for the reasons stated above.

Appellants have not directed us to evidence to establish the criticality of the plasma processing system.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner’s decision rejecting the appealed claims is affirmed.

ORDER

The rejection of claims 63 and 69 under 35 U.S.C. §112, first paragraph, is reversed.

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The rejection of claims 1-10, 16, 17, 19, 23-25, 28-33, 35, 36, 42-45, 48, 50, 54, and 57-75 under 35 U.S.C. § 103 as set forth in the stated rejections are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

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